

Headache Impact Test-6 (HIT-6) Scores for Migraine Patients: Their Relation to Disability as Measured from a Headache Diary

Hae Eun Shin, MD^a; Jeong Wook Park, MD^a; Yeong In Kim, MD^b; Kwang Soo Lee, MD^b

Department of ^aNeurology, Uijeongbu St. Mary's Hospital, The Catholic University of Korea College of Medicine, Uijeongbu, Korea

Department of ^bNeurology, Kangnam St. Mary's Hospital, The Catholic University of Korea College of Medicine, Seoul, Korea

Background and Purpose Complete information on migraine-related disabilities facilitate the making of appropriate treatment decisions. Although the accessibility and ease of use of the Headache Impact Test-6 (HIT-6) make it a very promising instrument, there are few data available for comparing HIT-6 scores with the actual amount of disability.

Methods To determine whether the disability measured using the HIT-6 questionnaire realistically reflects the amount of disability as extracted from a headache diary, which would help when deciding a management plan, 130 patients with migraine without aura were instructed to complete a headache diary on the days on which headache occurred. Each diary booklet also contained questions on the resulting disability, and comprised five items originating from the Migraine Disability Assessment Scale. After submitting their diaries, the participants completed the HIT-6 for the same time period.

Results Disability as recorded in diaries was present for a mean of 2.7 days per month, and its duration differed significantly with HIT-6 score: 0.9, 2.6, and 4.6 days per month for little-to-no impact, moderate impact, and severe impact, respectively. The summed disability score from diaries was also related to the HIT-6 score. Headache frequency was the only headache characteristic that contributed significantly to the HIT-6 score.

Conclusions This study demonstrates that the HIT-6 could be useful for assessing headache-related disability in migraine patients, especially given that the questionnaire is both simple and ease of use.

J Clin Neurol 2008;4:158-163

Key Words migraine, disability, Headache Impact Test-6, Migraine Disability Assessment Scale, diary.

Received June 9, 2008

Revised October 14, 2008

Accepted October 20, 2008

Correspondence

Jeong Wook Park, MD
Department of Neurology,
The Catholic University of Korea,
Uijeongbu St. Mary's Hospital,
65-1 Geumo-dong, Uijeongbu
480-130, Korea
Tel +82-31-820-3575
Fax +82-31-821-3662
E-mail pjw516@catholic.ac.kr

Introduction

The detrimental effects of migraine on functional ability and health-related quality of life are well established, and clinical evaluation of migraine-related disability can facilitate making appropriate treatment decisions.^{1,2} However, the degree to which an individual migraine patient suffers from disability needs to be understood, which necessitates the collection of data from patients' subjective assessments of the multidimensional burden of headache.³ Various questionnaires have been developed to measure specific aspects of a patient's migraine burden, but few questionnaires have been designed to measure the global impact of migraine.⁴⁻⁶

The Headache Impact Test-6 (HIT-6) was developed to

measure a wide spectrum of the factors contributing to the burden of headache, and it has demonstrated utility for generating quantitative and pertinent information on the impact of headache.⁷⁻⁹ The HIT-6 consists of six items: pain, social functioning, role functioning, vitality, cognitive functioning, and psychological distress.⁷ The patient answers each of the six related questions using one of the following five responses: "never", "rarely", "sometimes", "very often", or "always". These responses are summed to produce a total HIT-6 score that ranges from 36 to 78, where a higher score indicates a greater impact of headache on the daily life of the respondent. Scores can be interpreted using four groupings that indicate the severity of headache impact on the patient's life.^{8,9} Extensive testing has shown the HIT-6 to be highly

reliable and internally consistent, and it has been translated into several languages.¹⁰⁻¹³ The HIT-6 also exhibits excellent accessibility and ease of use.⁷⁻¹⁴ Although the HIT-6 is a very promising instrument, there are few data available for comparing HIT-6 scores with the actual amount of disability, which would help in interpreting the results when creating a management plan.^{15,16}

We undertook this study to examine the usefulness of the HIT-6 as a measure of headache-related disability, in terms of assessing the degree to which the HIT-6 score reflects headache characteristics such as the pain intensity and headache frequency, and the realistic amount of disability as determined from the headache diary.

Methods

Participants and clinical assessment

One hundred and fifty-five patients with migraine without aura were consecutively recruited from a headache clinic. All the participants were interviewed clinically and examined physically and neurologically by experienced neurologists (J.W.P. and H.E.S.). During the interview, a structured questionnaire was used to obtain detailed data regarding the clinical symptoms and features of the patient's headache. The diagnosis of migraine was made based on the operational diagnostic criteria of the International Headache Society {International Classification of Headache Disorders (ICHD)-II}.¹⁷ We did not include patients who presented with chronic migraine or who had taken analgesics for headache more than 10 times during the previous 3 month. Each patient provided written informed consent to participate in this study.

Data collection

The headache diaries were handed out at the initial visit, along with sufficient information about the required contents. The participants were instructed to complete a diary at the same time each day (preferably at night) on days on which they experienced a headache. Each diary booklet covered a 4-week period, and the booklet comprised questions on headache characteristics and the symptoms associated with each attack. The headache pain intensity was measured using a visual analog scale anchored from 0 to 10, where 0 meant no pain at all and 10 meant pain as bad as it can be. The diary also contained five questions on disability that originated from the Migraine Disability Assessment Scale (MIDAS), covering a reduction in ability of more than 50% to attend work or school, a reduction in ability of more than 50% to do household work, and an inability to participate in nonwork activities (total score of 0–3 for each headache attack; see

Appendix). Completed diaries were collected from the participants when they were asked to come to our clinic at the end of the diary period. After reviewing the diaries for completeness and consistency, we counted the summed disability score and the total number of days on which the subjects experienced headache-related disability. Disability due to a headache attack was considered to be present if the disability score was greater than zero. After submitting their diaries, the participants completed the HIT-6 questionnaire for the same time period. We used the validated Korean-translated version of the HIT-6. The disability was quantified using the following four impact grades based on the obtained HIT-6 score (see www.headachetest.com/HIT6translations.html): (1) little-to-no impact (HIT-6 score: 36–49), moderate impact (HIT-6 score: 50–55), substantial impact (HIT-6 score: 56–59), and severe impact (HIT-6 score: 60–78).

Of the 155 study subjects initially enrolled in the diary study, 25 were excluded from data analysis due to them not experiencing a headache attack during the diary period, inadequate data, and/or moving away. Therefore, 130 subjects were finally included in this study.

Statistical analysis

The categorical variables were summarized using percentages, and the continuous ones were generally summarized by descriptive statistics (using mean \pm standard deviation values). The relationships of the HIT-6 score with headache features and disability from the headache diary were estimated using correlation analysis, and differences between groups with different HIT-6 scores were evaluated using analysis of variance after confirming that the data conformed to a normal distribution. SPSS statistical software (version 10.0) was used for all the analyses. A probability value of <0.01 was considered statistically significant.

Results

The 130 migraine subjects contributed 612 diary records of headache attack during the diary recording period (mean length of the diary period: 33.4 days). The demographic and headache characteristics of the study participants are summarized in Table 1. Females comprised 81% of the participants. Headache-related disability was present on 2.7 ± 2.5 days during the study period, and the summed disability score was 4.3 ± 3.9 points (Table 1). The averaged HIT-6 score was 53.4 ± 8.7 points, and 68% of the patients were impacted to a moderate-to-severe degree according to the HIT-6 score (Table 2). Correlation analysis revealed that the frequency of headache attacks, duration of disability, and summed disability score from the diary were significantly correlated

with the severity of headache-related disability at each attack (Table 3).

Comparison of the headache characteristics according to the HIT-6 score showed that the headache frequency was

Table 1. Demographic and headache characteristics of the study population, and disability as measured from the headache diary

Number of subjects	130
Total number of headache attacks recorded in the diary record	612
Age (years, mean ±SD)	36.6 ±9.5
Females {number (%)}	105 (81)
Frequency of headache attacks (number, mean ±SD)	4.7 ±2.7
Duration of headache attacks (hours, mean ±SD)	6.1 ±3.4
Pain intensity of headache attacks (VAS, mean ±SD)	7.8 ±3.4
Duration of disability (days, mean ±SD)	2.7 ±2.5
Summed disability score (points, mean ±SD)	4.0 ±3.9

SD: standard deviation, VAS: visual analog scale.

Table 2. Degree of disability in the study population as assessed using the Headache Impact Test-6 (HIT-6) score

Averaged HIT-6 score (points, mean ±SD)	53.4 ±8.7
Impact grade of the HIT-6 {number (%)}	
Little or none	41 (32)
Moderate	30 (23)
Substantial	28 (22)
Severe	31 (23)

Table 3. Correlation coefficients between headache characteristics and disability from headache diaries as assessed using the HIT-6 score

	Correlation coefficient (r) for the severity of disability
Frequency of headache attacks (number)	0.277*
Duration of headache attacks (hours)	0.122
Pain intensity of headache attacks (VAS)	0.160
Duration of disability (days)	0.552*
Summed disability score (points)	0.476*

*p<0.01.

significantly higher in the severe-impact group than in the little-to-no-impact group, whereas the duration of headache attack and the pain intensity did not differ with the HIT-6 score (Table 4). The mean duration of disability and the summed disability score from the diary tended to increase with the HIT-6 score. A subgroup comparison revealed that the duration of disability differed significantly among little-to-no impact (0.9 days), moderate impact (2.6 days), and severe impact (4.6 days) on the HIT-6. The summed disability score was significantly higher for severe impact (7.3 points) than for little-to-no (1.4 points) or moderate (3.6 points) impact on the HIT-6.

Discussion

The high level of migraine self-awareness observed in previous studies appears to indicate that inadequate migraine management is not due to a deficient diagnosis, but rather to treatment with inappropriate consideration of the headache-related disability.^{18,19} The revised US and European guidelines for migraine have established that frequent migraine attacks associated with significant disability warrant preventive treatment.^{20,21} The Disability in Strategies of Care (DISC) study indicated that a stratified strategy for the acute treatment of migraine based on the migraine-related disability provides satisfactory clinical outcomes.²² In order to facilitate accurate estimations of disability, physicians and patients would benefit from a tool that is quick and easy to administer, and precise to interpret. The HIT-6 was developed for this purpose and it is routinely used as a valid measure of headache-related disability.^{7,9,23} However, to our knowledge this is the first study to apply the HIT-6 to a population of migraine patients in a neurology-based headache clinic. Moreover, few studies have compared HIT-6 scores and other measures of headache-related disability, and none have been designed to compare HIT-6 scores with disabilities recorded in headache diaries for the same time period.^{16,24}

One previous concern about the HIT-6 is that it primarily focuses on headache frequency, pain intensity, and the dura-

Table 4. Comparison of headache characteristics and disability from the headache diaries according to the impact grade of the HIT-6

	Impact grade of the HIT-6			
	Little/None	Moderate	Substantial	Severe
Frequency of headache attacks (number)	3.9 ±2.1	4.7 ±2.3	4.8 ±2.2	5.8 ±3.4*
Duration of headache attacks (hours)	5.2 ±2.1	7.0 ±4.2	6.7 ±5.4	6.2 ±3.0
Pain intensity of headache attacks (VAS)	7.1 ±4.1	9.1 ±3.8	6.8 ±4.2	8.4 ±3.3
Duration of disability (days)	0.9 ±1.3	2.6 ±2.0*	3.1 ±1.7*	4.6 ±2.8*†
Summed disability score (points)	1.4 ±1.9	3.6 ±2.8	4.5 ±2.7	7.3 ±6.5*†

Data are mean ±SD values.

*p<0.01 compared to the little-to-no-impact group, †p<0.01 compared to the moderate-impact group.

HIT-6: Headache Impact Test-6.

tion of headache attacks. Previous studies have shown that headache frequency and other characteristics could be contributing factors to migraine-related disability,^{25,26} but no studies have verified the relationship between these factors and disability as measured by the HIT-6. In the present study, an increasing frequency of headache attacks—which is known to be central to the MIDAS score—appeared to be related with an increased disability impact, as assessed by the HIT-6 questionnaire.¹⁰ It may seem counterintuitive that the pain intensity and the duration of a headache attack do not play a major role in determining the disability because there is a threshold of pain that causes disability and the length of time of a headache should be elementary to experiencing disability in daily living.^{27,28} Therefore, determinants of disability other than the attack frequency should be an important focus of further research for developing appropriate management regimens that target these variables to reduce headache-related disability in migraine patients.

The primary focus of this study was determining whether the HIT-6 can provide a realistic measure of the amount of disability as determined from the diary record. We found a strong correlation between HIT-6 scores and the duration of disability recorded in headache diaries, and demonstrated that HIT-6 scores are closely related to the overall burden of a migraine. Especially, the mean duration of disability differed significantly between patients with a moderate impact on the HIT-6 (2.6 days) and those with either little-to-no (0.9 days) or severe (4.6 days) impact on the HIT-6 during the study period. The summed disability scores, which corresponded to those of the MIDAS, also closely matched HIT-6 scores. The summed disability scores were significantly higher for severe impact on the HIT-6 than for less than a moderate impact on the HIT-6. The MIDAS questionnaire, which was developed to stratify patients in terms of treatment and to monitor the clinical course of patients, is not very user-friendly for routine application.⁴ Moreover, the MIDAS only targets the duration of headache and it involves a 3-month recall period, which could be too long for measuring short-term clinical changes. When extrapolating the results of previous guidelines and the DISC study, migraine sufferers with severe impact (a HIT-6 score above 60) should ideally be treated with specific drugs such as triptans or by preventive treatment if this high impact on the HIT-6 appears for a long time.²⁰⁻²²

In conclusion, this study demonstrates that the HIT-6 can be useful for assessing headache-related disability over a 1-month time period. The simplicity and speed of the questionnaire further make the HIT-6 a useful tool for physicians to acquire pertinent data on a patient's perceived burden of headache.¹⁴

Acknowledgments

This study and research protocol were fully accepted by an institutional review board of Catholic University of Korea.

REFERENCES

1. Terwindt GM, Ferrari MD, Tijhuis M, Groenen SM, Picavet HS, Launer LJ. The impact of migraine on quality of life in the general population: the GEM study. *Neurology* 2000;55:624-629.
2. Lipton RB, Liberman JN, Kolodner KB, Bigal ME, Dowson A, Stewart WF. Migraine headache disability and health-related quality-of-life: a population-based case-control study from England. *Cephalalgia* 2003;23:441-450.
3. Holmes WF, MacGregor EA, Dodick D. Migraine-related disability: impact and implications for sufferers' lives and clinical issues. *Neurology* 2001;56 (6 Suppl 1) :S13-S19.
4. Stewart WF, Lipton RB, Simon D, Von Korff M, Liberman J. Reliability of an illness severity measure for headache in a population sample of migraine sufferers. *Cephalalgia* 1998;18:44-51.
5. Jacobson GP, Ramadan NM, Norris L, Newman CW. Headache disability inventory (HDI): short-term test-retest reliability and spouse perceptions. *Headache* 1995;35:534-539.
6. El Hasnaoui A, Vray M, Richard A, Nachit-Ouinekh F, Boureau F, MIGSEV Group. Assessing the severity of migraine: development of the MIGSEV scale. *Headache* 2003;43:628-635.
7. Bayliss MS, Dewey JE, Dunlap I, Batenhorst AS, Cady R, Diamond ML, et al. A study of the feasibility of Internet administration of a computerized health survey: the headache impact test (HIT). *Qual Life Res* 2003;12:953-961.
8. Kosinski M, Bayliss MS, Bjorner JB, Ware JE Jr, Garber WH, Batenhorst A, et al. A six-item short-form survey for measuring headache impact: the HIT-6. *Qual Life Res* 2003;12:963-974.
9. Ware JE Jr, Bjorner JB, Kosinski M. Practical implications of item response theory and computerized adaptive testing: a brief summary of ongoing studies of widely used headache impact scales. *Med Care* 2000;38 (9 Suppl 1) :I173-I182.
10. Stewart WF, Lipton RB, Kolodner KB, Sawyer J, Lee C, Liberman JN. Validity of the Migraine Disability Assessment (MIDAS) score in comparison to a diary-based measure in a population sample of migraine sufferers. *Pain* 2000;88:41-52.
11. Iigaya M, Sakai F, Kolodner KB, Lipton RB, Stewart WF. Reliability and validity of the Japanese Migraine Disability Assessment (MIDAS) Questionnaire. *Headache* 2003;43:343-352.
12. Ertaş M, Siva A, Dalkara T, Uzuner N, Dora B, Inan L, et al. Validity and reliability of the Turkish Migraine Disability Assessment (MIDAS) questionnaire. *Headache* 2004;44:786-793.
13. D'Amico D, Mosconi P, Genco S, Usai S, Prudenzano AM, Grazi L, et al. The Migraine Disability Assessment (MIDAS) questionnaire: translation and reliability of the Italian version. *Cephalalgia* 2001; 21:947-952.
14. Pryse-Phillips W. Evaluating migraine disability: the headache impact test instrument in context. *Can J Neurol Sci* 2002;29 Suppl 2: S11-S15.
15. Bjorner JB, Kosinski M, Ware JE Jr. Using item response theory to calibrate the Headache Impact Test (HIT) to the metric of traditional headache scales. *Qual Life Res* 2003;12:981-1002.
16. Nachit-Ouinekh F, Dartigues JF, Henry P, Becq JP, Chastan G, Lemaire N, et al. Use of the headache impact test (HIT-6) in general practice: relationship with quality of life and severity. *Eur J Neurol* 2005;12:189-193.
17. Headache Classification Subcommittee of the International Headache Society. The International Classification of Headache Disorders: 2nd edition. *Cephalalgia* 2004;24 Suppl 1:9-160.
18. De Diego EV, Lanteri-Minet M. Recognition and management of

HIT-6 Scores for Migraine Patients

- migraine in primary care: influence of functional impact measured by the headache impact test (HIT). *Cephalalgia* 2005;25:184-190.
19. Weber M, Daurès JP, Fabre N, Druais PL, Dardenne J, Slama A, et al. [Influence of general practitioners' personal knowledge on migraine in medical attitudes towards their patients suffering from migraine]. *Rev Neurol (Paris)* 2002;158:439-445.
 20. Lewis D, Ashwal S, Hershey A, Hirtz D, Yonker M, Silberstein S; American Academy of Neurology Quality Standards Subcommittee; Practice Committee of the Child Neurology Society. Practice parameter: pharmacological treatment of migraine headache in children and adolescents: report of the American Academy of Neurology Quality Standards Subcommittee and the Practice Committee of the Child Neurology Society. *Neurology* 2004;63:2215-2224.
 21. Members of the task force: Evers S, Afra J, Frese A, Goadsby PJ, Linde M, May A, et al. EFNS guideline on the drug treatment of migraine - report of an EFNS task force. *Eur J Neurol* 2006;13:560-572.
 22. Lipton RB, Stewart WF, Stone AM, Láinez MJ, Sawyer JP; Disability in Strategies of Care Study group. Stratified care vs step care strategies for migraine: the Disability in Strategies of Care (DISC) Study: a randomized trial. *JAMA* 2000;284:2599-2605.
 23. Ware JE Jr, Kosinski M, Bjorner JB, Bayliss MS, Batenhorst A, Dahlöf CG, et al. Applications of computerized adaptive testing (CAT) to the assessment of headache impact. *Qual Life Res* 2003; 12:935-952.
 24. Magnoux E, Freeman MA, Zlotnik G. MIDAS and HIT-6 French translation: reliability and correlation between tests. *Cephalalgia* 2008; 28:26-34.
 25. Stewart WF, Lipton RB, Kolodner K. Migraine disability assessment (MIDAS) score: relation to headache frequency, pain intensity, and headache symptoms. *Headache* 2003;43:258-265.
 26. Magnusson JE, Becker WJ. Migraine frequency and intensity: relationship with disability and psychological factors. *Headache* 2003; 43:1049-1059.
 27. Stewart WF, Schechter A, Lipton RB. Migraine heterogeneity. Disability, pain intensity, and attack frequency and duration. *Neurology* 1994;44 (6 Suppl 4) :S24-S39.
 28. Holroyd KA, Drew JB, Cottrell CK, Romanek KM, Heh V. Impaired functioning and quality of life in severe migraine: the role of catastrophizing and associated symptoms. *Cephalalgia* 2007;27:1156-1165.

□ Appendix □

Questions included in the headache diary booklet for estimating headache-related disability

	Questions about disability	Score	
		1	0
1	Did you miss work or school today because of this headache?	Yes	No
2	Was your productivity at work or school at least halved today because of this headache? (Do not mark this question if you answered "yes" to question 1.)	Yes	No
3	Were you unable to do housework or chores today because of this headache?	Yes	No
4	Was your productivity for housework or chores at least halved today because of this headache? (Do not mark this question if you answered "yes" to question 3.)	Yes	No
5	Did you miss family, social, or leisure activities today because of this headache?	Yes	No
Total Score (0–3): _____		points	